What is a celebrity?

- Within a group of people $G$
  We say a person $p$ is a celebrity (famous) iff:
    - Everyone knows who $p$ is
      (celebrities must be known by everyone)
    - Person $p$ does not know who anyone else is

- Person $p$ might be a celebrity within $G$
  - How can you check?
  - What actions can we take?
Who is a Celebrity?

- Checking if person \( p \) is a celebrity:
  
  ```
  for each person \( x \) in \( G - \{ p \} \)
  if \( p \) knows \( x \)
    return true
  else
    if \( x \) does not know \( p \)
      return false
  return true
  ```

  \( 2 \) questions

  \( n - 1 \) people: \( 2n - 2 \) questions

  Is there a celebrity in group? \( 2n^2 - 2n \)

  for each \( p \in G \)
  check if \( p \) is celebrity

Finding a Celebrity

- The previous solution was “brute force”
- Can we do better?
- Things to look for:
  - Did we repeat work?
    (Work that was needed, but was done twice)
    
  - Did we do unnecessary work?
    (Work that we could have done without)
Finding a Celebrity

Given group $G$, is there a celebrity? If so, who?

$G' = \text{copy of } G$

While $|G'| > 1$

- Select $a,b$ distinct and arbitrary from $G'$
  - if $a$ knows $b$
    - remove $a$ from $G'$
  - else remove $b$ from $G'$

$P \leftarrow$ only one left in $G'$

Check if $P$ is celebrity

$n-1$ questions

Total

$2n-2$ qs

Finding a Celebrity

- Previous solution assumes at most one celebrity
- Would a group have two or more?

Suppose FOC a group could

let $a,b$ be two distinct celebs

does $a$ know $b$?
  - If yes: $a$ not celeb
  - If no: $b$ not celeb